



Indian Explosives Act (IV of 1884.)

SIXTH ANNUAL REPORT

OF THE

CHIEF INSPECTOR OF EXPLOSIVES  
IN INDIA,

BEING HIS

*Annual Report for the Year ending  
31st March 1905.*



*Administration*

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CALCUTTA:

OF THE SUPERINTENDENT OF GOVERNMENT PRINTING, INDIA,  
1905.

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OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING, INDIA,  
1905.



# *Sixth Annual Report of the Chief Inspector of Explosives, India.*

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No. 759.

FROM

MAJOR C. A. MUSPRATT-WILLIAMS, R.A.,

*Chief Inspector of Explosives,*

TO

THE SECRETARY TO THE GOVERNMENT OF INDIA,

DEPARTMENT OF COMMERCE AND INDUSTRY.

*Simla, the 15th July 1905.*

SIR,

I HAVE the honour to submit herewith a report of the work of my  
Department for the year ending 31st March 1905.  
Introductory.

2. Captain F. G. Smallwood, R.A., was in charge of the Department  
from 1st April to 6th November 1904, while I was  
on leave.  
Personnel.

3. During the year 1904, 105 licenses (four more than in the previous  
year) were granted in British India under Rule 17 of  
the Rules to regulate the manufacture, possession  
and sale of explosives. The number of magazines licensed was 150, four more  
than in 1903, and is in excess of the number of licenses granted, because  
in a number of cases firms have two or more magazines under one license.  
A statement showing the number and location of the magazines, and also the  
number of licenses granted in British India is given in Appendix A. It will be  
seen from this statement how widely dispersed these magazines are, and  
consequently how much time is spent in getting from place to place, which  
necessarily to a certain extent curtails the number of inspections that can be  
made during the year.  
Number of Magazines.

4. During the year 270 inspections of magazines were made, a number of  
the magazines being inspected two or three times  
each. Those magazines are inspected most frequently  
which are situated in the neighbourhood of towns  
or in populous localities, or which contain large quantities of explosives or any  
explosive, which on account of greater susceptibility to decomposition it is  
considered advisable to examine and test more often than other explosives. The  
Roburite Factory at Karachi was inspected twice. In addition to these  
inspections, a number of registered premises were visited.  
Inspection of explosives  
during the year.

5. The magazines generally are in good order, and I have found magazine  
owners most willing to carry out my recommend-  
ations, even when involving considerable expense,  
and my thanks are due to them for making my duties easy in this respect.  
Condition of Magazines.

6. The physical condition of all the explosives in the different magazines during the year was found to be good, and none of the samples taken at inspections failed to pass the tests laid down, which were carried out as usual by the Chemical Examiners at Calcutta, Bombay, Madras and Rangoon, and also by the testing officer at Karachi.

7. During the year five cases of theft of explosives from magazines in the coal districts in Bengal were reported to this office. I have been given to understand that the dynamite and detonators thus obtained are very often disposed of to the owners of petty mines, who have no magazine license, and who are only too glad to be able to get these explosives at a less than market price, thereby creating a demand and encouraging robbery. The fact of the magazines being strongly built does not appear to prevent their being broken into, and I am afraid these robberies are always likely to occur where reliable chowkidars, such as old pensioned sepoys, are not employed to guard the magazine. In some cases no chowkidars are employed at all.

8. During the year under report the Government of India addressed all the local Governments, enlarging the functions of the Chief Inspector of Explosives, and constituting him expert adviser in petroleum matters, not only to the Government of India but also to all local Governments and Administrations. The Government of India also considered it advisable that this officer should during his tours make visits of inspection to bulk oil installations and to other places where petroleum was stored or used, in order that he might be in a position to observe for himself at first hand the working of the regulations and to draw attention to any points which might require remedying. The necessary alterations in the Provincial Petroleum Rules, giving him and the Inspector of Explosives powers to inspect, are now being introduced. In consequence of the above orders, I personally visited the large bulk oil installations at Madras, Bombay, Karachi, Calcutta (Budge Budge and Narculdanga), Chittagong and Rangoon, and also the oil fields and oil refineries in Assam and Burma. In addition to these, 60 inspections of small bulk oil installations, such as are usually situated near railway stations, were made by the Inspector of Explosives and myself.

9. The large installations are usually under European supervision, and are, on the whole, fairly well looked after, although in the older installations the tanks are very much closer to each other and to other buildings than would be now allowed. At Budge Budge, where there is ground available allowing for extension, steps have already been taken to get rid of existing defects and risks. This was referred to in page 4 of my 5th Annual Report.

10. The Burmah Oil Company under the supervision of the Port Trust, Bombay, have just erected a bulk oil installation at Chinkpugli, which is as safe as it is possible for human precautions to make it, and has the appearance of a fortress. The Standard Oil Company and Burmah Oil Company are also just about to erect installations at Karachi, for which the designs and plans have been submitted to me. In Madras the Burmah Oil Company have submitted proposals for an oil installation on the sandy accretion to the south of the Madras Harbour, which has been allotted to them by the Port Trust authorities. From this it will be seen how fast the Petroleum Industry is expanding.

11. The small installations are situated mostly near Railway stations, and are generally looked after by native agents, employed by the large oil firms. I regret to say that a number of these installations are in a very undesirable, and, in fact, I may say dangerous condition. For instance these installations have enclosure walls round them to contain all the oil stored within them in case of its escape, possibly in a burning state, from the tanks or their receptacles.

These walls have very often had holes knocked in them for draining purposes, so that they have been rendered absolutely useless as safeguards. In other cases, the enclosure intended for the retention of oil in case of its escape has been filled up with empty drums and other rubbish, and there have also been other serious defects noticed. Presumably some inspection of these installations has been made by local officials, but evidently from want of technical knowledge such inspections have not been of much use, and the installations appear to have been licensed from year to year in a defective state. I have addressed a circular letter to all the local Governments and to all the oil firms pointing out the very great danger of holes in a containing wall, and recommending that, where drainage was necessary, an iron pipe with valve should be fitted and only kept open when actually required for use. Reports also have been submitted to District Magistrates after each inspection of these small installations, pointing out the defects to be corrected. I believe there are about 300 of these small installations scattered about the length and breadth of British India, and they are increasing in number daily. Although I consider that regular expert inspection of these installations is imperative, at the same time I am afraid it is a practical impossibility for me to arrange for the inspection of more than a comparative small number of them yearly.

12. No accidents have occurred in the magazines or in the one factory (Roburite Factory) licensed in this country.  
 Accidents. A list of other accidents by fire or explosion that have occurred with explosives, inflammable substances, dangerous chemicals, etc., between the 1st January 1904 and the 31st December 1904, and that have been brought to the notice of this Department, is given in Appendix B, and gives a short account of each one. It will be seen from the perusal of the details that the accidents have mostly taken place owing to gross carelessness or through other neglect of ordinary precautions. In all there were forty-seven accidents causing eighty deaths and injuries to seventy people. The death rate is considerably higher than it has been in previous years, but this is due to a bad petroleum fire on board an Irrawaddy Flotilla Steamer, the "Yomah," in trying to escape from which a number of persons were drowned. Comparative statements given in Appendices C and D show the total number of accidents, and of persons killed and injured during the five years 1900 to 1904.

13. There were eleven gunpowder accidents during the year, causing the deaths of twenty-five persons and injuries to thirty.  
 Gunpowder. One accident alone (Index No. 10) was responsible for sixteen killed and sixteen injured, and as an example of recklessness, cannot well be surpassed.

14. Dynamite (five accidents) were responsible for three deaths and injuries to ten persons.  
 Dynamite.

15. Thirteen accidents from fireworks have been reported to this Department, causing ten deaths and injuries to nine persons. Most of the accidents are caused by the Sulphur Chlorate combination of fireworks, which are prohibited in England, but which the Government of India, after due consideration of all the points at issue, decided not to prohibit in India.  
 Fireworks.

16. There were eight accidents from petroleum reported during the year which were responsible for forty-two deaths and injuries to ten people. One very regrettable accident, already referred to in this report, was responsible for thirty-one of these deaths, and was due to a neglect of rules in the shipment of crude oil in wood barrels, which allowed the oil to leak and get ignited. Another accident, which is always reoccurring, was due to a man taking a lamp to look into a tank, from which oil had been discharged, to see how much was left.  
 Petroleum.

17. Four million seventeen thousand and two hundred pounds of explosives, or roughly about two thousand and eight tons, were imported by sea into British India during the  
 Import of Explosives.



year 1904, the value being Rs. 20,28,193. This shows an increase of one hundred and nineteen tons over the imports of 1903, and the import of explosives has increased by 911 tons since 1901, *vide* Appendix F. These figures show how the trade in explosives is increasing year by year. Full details, showing the different kinds of explosive imported during the year and the value of each, are given in Appendix E.

18. The Petroleum Industry in India has developed most rapidly in the last few years, which is shown by the fact that the output or production of crude petroleum in British India rose from 19,000,000 gallons in 1897 to 88,000,000 gallons in 1903. The imports of American and Russian oil have lately decreased, but there has been a considerable increase in the imports of Borneo Oil. I am indebted to the "Review of the Trade of India" in 1903-1904, published by the Director General of Statistics, for the information that the total value of the trade in Mineral Oil was 338½ lakhs, of which nearly 301 lakhs represented the value of Kerosene.

19. The present petroleum rules are somewhat antiquated and unsuited to present day requirements, and do not lay down clearly the conditions under which bulk oil installations should be licensed. Moreover the rules differ in each province instead of being uniform. The Government of India will be shortly issuing to local Governments for criticism a uniform set of rules for each province, which will remedy all these defects. It is unfortunate that the Indian Petroleum Act will not allow of one set of consolidated rules being issued by the Government of India for the whole of India, but it is intended that the future provincial rules shall be kept similar with the exception that provisos for local conditions may be introduced, where absolutely imperative.

20. Draft instructions, however, for the possession of dangerous petroleum have been issued to local Governments in advance of the above rules. These are given in Appendix G. These rules are based on recommendations I have made after a number of informal conferences with representatives of the oil trade, and should give considerable relief to those interested in the petrol trade, who find the present rules too restrictive. I believe also that at the recommendation of the Government of India considerable relaxation will shortly be made by the local Governments in the rules for the transport of dangerous petroleum and also that the fees for possession and transport will be considerably reduced.

21. Carbide of Calcium comes under the Indian Petroleum Act, and consequently each province has to have its own set of rules. The final issue of these rules has been delayed owing to new concessions having been allowed in England, which it is proposed to adopt in the Indian Rules, such as the possession of 28 lbs. of carbide of calcium without a license under certain conditions, and also the raising of the quantity that may be allowed to be packed in any one drum to 224 lbs.

22. As enquiries have constantly been addressed to this Department as to the kind of store house, which would be suitable and safe for the storage of petrol by motorists, I circulated to local Governments a plan of such a store house together with notes on its construction. These are given in Appendices H and I.

23. One Consolidated Set of Rules for the whole of India for the manufacture, possession and sale of explosives has now been published for criticism. These rules have been rearranged, and are in simpler form than the old rules. The rules for registered premises have been made similar to those in vogue in England, which are less restrictive than those that have been in force in India up to date. A number of complaints on this subject had been made by firms interested.

24. New and simpler rules for the packing of explosives for conveyance were issued lately in England and draft amendments embodying similar changes in India have been published by the Government of India for criticism together with a list of "Authorised Explosives" prepared by this Department and published in the same Gazette. This list is given in Appendix J and will be published annually in the Gazette of India and in this Department's Annual Report.

25. In my Annual Report for 1904, I discussed the question of the extension of the Bombay Docks, which would bring them in close proximity to the bulk oil installations at Mody Bay, and recorded my opinion that this was undesirable. I am glad to say that the Port Trust, Bombay, have now decided to remove these installations in due course to another site near Sewri.

26. As there is now considerable lighting by Acetylene gas in this country, I have thought it advisable to draw attention to three precautions, which all those who have anything to do with Acetylene installations should strictly observe :—

1. Never bring a light into the building or near to any part of an acetylene apparatus which is being cleaned out.
2. Never attempt to repair with soldering iron or flame any vessel that has held acetylene until it has been filled with water.
3. Never enter the building or approach any vessel with a lighted pipe, cigarette or cigar.

It should always be remembered that acetylene has a wider range of explosive proportions with air than other gases, and also is practically of the same weight as atmospheric air, so that it will not move of its own accord out of a receptacle, but requires to be forced out.

27. As I am constantly being asked for information as to how to destroy dynamite and detonators, I have drawn up some instructions which are given in Appendix K.

I have the honour to be,

SIR,

Your most obedient Servant,

C. A. MUSPRATT-WILLIAMS, *Major, R.A.,*  
*Chief Inspector of Explosives.*



# APPENDIX A.

List of Magazines and Licenses granted under Rule 17 of the Explosives Rules for the year 1904.

Province or Presidency.	District.	MAGAZINES-			LICENSES. *		
		Under renewed license.	Under new license.	TOTAL.	Renewed.	New.	TOTAL.
ASSAM	Cachar	1	...	1	1	...	1
	Lakhimpur	1	...	1	1	...	1
	TOTAL	2	...	2	2	...	2
BENGAL	Burdwan	19	...	19	16	...	16
	Darjeeling	3	...	3	3	...	3
	Gaya	7	...	7	5	...	5
	Hazaribagh	12	2	14	10	2	12
	Hooghly	4	...	4	1	...	1
	Manbhum	16	...	16	13	...	13
	TOTAL	61	2	63	48	2	50
BOMBAY†	Bombay	12	3	15	7	2	9
	Karachi*	8	...	8	4	...	4
	TOTAL	20	3	23	11	2	13
BURMA	Mergui	1	...	1	1	...	1
	Ruby Mines	1	...	1	1	...	1
	Syriam	2	...	2	1	...	1
	TOTAL	4	...	4	3	...	3
CENTRAL PROVINCES	Bilaspur	1	...	1	1	...	1
	Chindwara	1	...	1	1	...	1
	Jubbulpur	2	1	3	1	1	2
	Nagpur	...	3	3	...	2	2
	Raipur	4	...	4	4	...	4
	Saugor	1	...	1	1	...	1
	Sconi	1	...	1	1	...	1
	TOTAL	10	4	14	9	3	12
MADRAS	Coimbatore	1	1	2	1	1	2
	Godaveri	5	...	5	2	...	2
	Madras	17	...	17	5	...	5
	Nellore	4	...	4	2	...	2
	The Nilgiris	3	2	5	2	1	3
	Vizagapatam	4	...	4	2	...	2
	TOTAL	34	3	37	14	2	16
UNITED PROVINCES	Cawnpur	2	...	2	2	...	2
	Dehra Dun	1	...	1	1	...	1
	Garhwal	1	...	1	1	...	1
	Lucknow	1	...	1	1	...	1
	Meerut	1	...	1	3	...	3
	Shahjehanpur	1	...	1	1	...	1
	TOTAL	7	...	7	9	...	9
SUMMARY.							
ASSAM		2	...	2	2	...	2
BENGAL		61	2	63	48	2	50
BOMBAY		20	3	23	11	2	13
BURMA		4	...	4	3	...	3
CENTRAL PROVINCES		10	4	14	9	3	12
MADRAS		34	3	37	14	2	16
UNITED PROVINCES		7	...	7	9	...	9
GRAND TOTAL		138	12	150	96	9	105

\* At Karachi there is in addition a Roburite Factory licensed under Rule 12.

† At Ahmedabad a temporary license was granted for 6 months under Rule 19 A.

## APPENDIX B.

Accidents by fire or explosion which have been brought to the notice of the Explosives Department  
from 1st January 1904 to 31st December 1904.

No.	Date of accident.	Nature of explosive.	Where accident occurred.	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS.	
					Killed.	Injured.
Explosives.						
1	19th Jan. 1904.	Gunpowder	Madras	A European employé of Messrs. Oakes & Co. had extracted about 20 lbs. of damaged gunpowder from old cartridges. While it was being conveyed on a trolley past a blacksmith's workshop to a neighbouring well to be destroyed by drowning, he flung a little on the blacksmith's fire to see if it was in a sufficiently good condition to blaze up, with the result that the main mass of the powder got ignited by a spark and exploded. He and two native employés were injured by the explosion.	...	3
2	21st Feb. 1904.	Gunpowder	Cuddalore	During the celebration of a festival at a village temple, three boys who had been watching the firing of shots, climbed over the wall of the temple after the priest and others had left and brought out a pot containing a small quantity of gunpowder and an iron tube. They filled the tube with the powder and set fire to it, with the result that there was an explosion causing fatal injuries to two of them.	2	...
3	22nd Feb. 1904.	Black powder	Gaya-Khatras Ry.	During blasting operations one charge misfired, and the next day, while further bore holes were being made the unfired charge exploded, due evidently to a bore hole being made too close to the unfired one.	1	3
4	18th April 1904.	Gunpowder	Tinnevely	During the process of pounding the ingredients for the manufacture of country gunpowder, an explosion occurred whereby two people were killed and one injured. The mortars used for mixing were of stone.	2	1
5	2nd May 1904.	Gunpowder	Tindivanam, South Arcot.	The Magistrate reported that a native had obtained about 4 lbs. of gunpowder for the purpose of firing shots during a festival. He opened the paper packet of powder and put the powder into a mud pan, and while doing so he dropped a small quantity on to the floor. Instead of collecting what had been spilled, he set fire to it with a wick taken from a lamp burning close by. The powder in the pan also immediately ignited and severely injured the man who subsequently died; another native who came to his rescue sustained injuries from the fire.	1	1
6	14th May 1904.	Gunpowder	Gaya-Khatras Ry.	While blasting, the skull of a man was fractured by a rock falling on him.	...	1
7	August 1904	Gunpowder	Kishingi	A party of Pathan coolies who had been employed on some blasting work, had stolen some gunpowder and buried it in the courtyard of a serai. They were unable to dispose of it, so left it concealed. A sweeper not knowing that the powder was there lit a fire, when the powder exploded causing slight injuries to the man.	...	1
8	7th Oct. 1904	Gunpowder	Baragur, Salem	The Magistrate reported that two natives were firing small quantities of gunpowder at short intervals. The powder was rammed into iron tubes attached to a log of wood in the ground and then set fire to. Some powder which was kept close by their side caught fire and exploded, killing one man and injuring another.	1	1
9	6th Nov. 1904	Gunpowder	Marudadu, Cuddalore.	The Magistrate, South Arcot, reported that while a native was loading a bamboo tube with gunpowder an explosion due to friction occurred, whereby the man was injured in his left hand, and another native who was standing near by received injuries to his face.	...	2
10	7th Nov. 1904	Gunpowder	Patwas	The Magistrate of Gaya reported that a dancing party was being held in the verandah adjoining a room in which a large quantity of gunpowder had been stored. Cigarettes and tobacco chillums were freely passing round among relatives and friends invited and the smouldering cigarettes and chillums were recklessly thrown into the room where the gunpowder was stored with the result that an explosion occurred and 32 men were injured of whom 16 died.	16	16
11	24th Dec. 1904.	Gunpowder	Nushki Ghat, Quetta-Nushki Ry.	The Sub-Divisional Officer, Quetta-Nushki Railway, reported that three coolies were mixing country and English powder when the powder ignited probably because an iron shovel was used. Two men were killed and the third injured.	2	1
TOTAL					25	30

No.	Date of accident.	Nature of explosive.	Where accident occurred.	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS.	
					Killed.	Injured.
Explosives—contd.						
12	22nd Feb. 1904.	Dynamite	No. 1 Tunnel near mile 30 of the Gaya-Khatras Railway.	During blasting operations one charge misfired, and in drilling the next round of holes, a drill struck the unexploded charge, which exploded, killing one man and injuring three others.	1	3
13	27th Feb. 1904.	Dynamite	Madras	A quantity of wetted dynamite was being destroyed. The Commissioner of Police reported that the empty cases and wrappers, etc., were put apart to be burnt separately from the dynamite. A European Inspector in the presence of the Deputy Commissioner of Police set fire to the pile and was standing aside, about 20 paces off, when there was a loud explosion and the cases, etc., were blown to atoms. The Inspector appears to have been injured as well as two coolies.	...	3
14	2nd May 1904.	Dynamite	Nishpa Tunnel	While drilling holes for blasting, an unexploded charge which was evidently not observed, exploded, killing one man and severely injuring another.	1	1
15	19th June 1904.	Dynamite	Chutterporo, Hazaribagh.	An explosion of dynamite occurred in the house of a Babu, an employé of the Dickson Irwin (Koderma) Mica Mining Syndicate, whereby he was killed. It appears that he used to keep some dynamite in his house. No absolute cause could be assigned for the accident.	1	...
16	Nov. 1904	Dynamite	Patwas	The Magistrate of Gaya reported that during blasting operations an exploded charge was struck by a drill in making a fresh hole near a previous charge. It appears that a hole already drilled was cleaned out for about 4 inches, the hole was tightly packed and seeing no fuse in it, a new hole was made near it and while drilling this one the explosion occurred injuring three persons.	...	3
					Total	3 10
17	30th Mar. 1904.	Cartridge	Calcutta	A sweeper was beating out the brass of a cartridge which he obtained from a godown in his employer's house without his knowledge, when it suddenly exploded and injured him.	...	1
					Total	... 1
18	10th Jan. 1904	Fireworks, Chinese cracker.	Bombay	About 3-30 A.M. a fire broke out in the shop of a firework seller and several other premises were involved. The cause of the fire could not be ascertained; no loss of life occurred.	...	...
19	14th Jan. 1904	Fireworks	Jullundur	A man was engaged in making fireworks at night in a shed; as the night was stormy and wet and the shed was somewhat exposed to the elements, he carried the firework mixture, about 10 lbs., into his dwelling house where his family were seated; a fire was burning at one end of the room and a gush of wind blew a spark on to the firework mixture, causing an explosion by which four people lost their lives.	4	...
20	22nd Jan. 1904.	Fireworks	Bombay	A Hindu was preparing fireworks for a wedding and was grinding and mixing $\frac{1}{4}$ a seer of chlorate and $\frac{1}{4}$ a seer of sulphur on a wood stool with a big stone, when the mixture exploded injuring him severely.	...	1
21	5th May 1904	Fireworks consisting of chlorate of potash and sulphurate of antimony.	Manghone, Monghyr.	The Sub-Divisional Officer reported that a native mixed chlorate of potash with sulphurate of antimony preparatory to tying it up in small quantities with pieces of small stones to make bombs. Some of the stones fell into the mixture which caused it to explode and injured the man.	...	1
22	2nd June 1904	Firework consisting of chlorate of potash and sulphur.	Calcutta	The Commissioner of Police reported that a native was grinding some ingredients for the purpose of making green light powder when there was a sudden explosion. He was thrown into a ditch adjoining the garden in which he had his licensed fireworks factory and killed. The fire spread to a quantity of gunpowder which was about 5 cubits away, burning a lad severely. It seems likely that the deceased was grinding chlorate of potash with sulphur, mistaking the former for Baryta.	1	1
23	14th July 1904	Crackers	Delhi Railway Station.	The Deputy Commissioner, Delhi, reported that two boxes said to contain locks, kites (patang) and glue were being despatched by train to Simla; the first box supposed to contain locks, was, according to the usual railway custom, dumped down in the van when it exploded and two of the coolies were seriously injured, one of them dying of his injuries. On the other box being opened, it was found to contain crackers with a top layer of tamarind flowers and pepper. The consignor was prosecuted and sentenced to 2 years' rigorous imprisonment and a fine of Rs. 1,000 or in default 6 months' further imprisonment.	1	1

No.	Date of accident.	Nature of explosive or oil.	Where accident occurred.	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS.	
					Killed.	Injured.
Explosives—concl'd.						
24	4th August 1904	Crackers consisting of chlorate of potash.	Calicut	The Magistrate reported that while potash crackers were being packed in a piece of cloth, they exploded and killed two boys who were doing the packing.	2	...
25	20th Oct. 1904	Chlorate of potash and momchal (sulphide of antimony).	Calcutta	The Commissioner of Police, Calcutta, reported that a man was mixing chlorate of potash and momchal in a tin box for the purpose of preparing some crackers when the mixture exploded and injured him and his wife. The man subsequently succumbed to his injuries.	1	1
26	30th Oct. 1904	Chlorate of potash and sulphide of arsenic.	Bombay	The Commissioner of Police reported that while a native was mixing chlorate of potash and sulphide of arsenic, an explosion took place injuring him slightly.	...	1
27	5th Nov. 1904	Fireworks consisting of chlorate of potash and sulphide of antimony.	Berhampur, Ganjam.	A firework dealer was mixing chlorate of potash and sulphide of antimony together for the preparation of fireworks, when the mixture suddenly exploded, presumably through friction, and injured him so that he died from the effects.	1	...
28	3rd Nov. 1904	Chlorate of potash and momchal.	Calcutta	The Commissioner of Police reported that a native was putting some chlorate of potash and momchal in a wooden box to dry in the sun for the purpose of making crackers when the mixture exploded and injured him severely. He was prosecuted for manufacturing fireworks without a license and fined.	...	1
29	11th Nov. 1904	Fireworks. Bombs consisting of chlorate of potash and arsenic de-sulphide.	Calcutta	A native was making smaller bombs from larger ones and when pressing one of them in his hands it exploded causing injuries.	...	1
30	Nov. 1904	Fireworks consisting of chloride of potassium and strontium.	.....	While mixing chloride of potassium and strontium for the manufacture of fireworks, an explosion occurred injuring the hands of a lad who was mixing these ingredients.	...	1
TOTAL					10	9

**Petroleum.**

31	13th Jan. 1904	Crude oil	Dunedaw, Burma	A fuel barge of the Burma Oil Company, which contained four tanks, was being filled with crude oil through pipes. The fuel barge carried a mooring lamp. At about 7-15 P.M. two tanks had been completely filled. Shortly after one of the native employes took the lamp to see how much oil there was in the third tank with the result that there was an explosion injuring two men and flames broke out on the barge. These were apparently successfully put out when a second explosion occurred, injuring 5 more men. One of the men died from his injuries.	1	6
32	11th March 1904	Petrol	Malabar Point, Bombay.	A fire broke out in a shed used as a petrol store room near the upper gate of Government House, Malabar Point, Bombay. The fire was extinguished but not before the shed had been destroyed. It appears that one of the servants went into the shed with a hurricane lamp, and was filling the petrol tank of a motor car with petrol, when the liquid ignited and set the structure on fire. The room contained rubber tyres for a motor car, which were so damaged as to render them useless. The total damage done by the fire was estimated at Rs. 800.	...	...
33	14th March 1904	Earth oil	Nyounghla	The steamer <i>Yomah</i> arrived at Nyounghla at about 3-30 P.M. with two flats. The port flat had on board the animals of a circus and the starboard flat had a cargo of rice bags, cases of kerosene oil, bundles of packing leaves, dried fish, etc. This flat was taking in a cargo of 112 barrels of Yenangyaung earth oil, when about 5-30 P.M. smoke and flames were seen rising between the flat and the steamer just by the paddle box, and soon the flat and steamer were on fire. The reason given for the accident was that probably oil had leaked and trickled down from the flat into the water and remained there floating and had been ignited by a match, cheroot or hot cinders which had been thrown overboard. Most of the people met their deaths by drowning in endeavouring to get away from the burning steamer.	31	...
34	19th April 1904	Kerosene	Cannanore	A tin of kerosene oil was kept near an oven in a native's house, and the vapour from it caught fire from the oven which resulted in three persons who were near by being seriously injured, two of whom died subsequently from the injuries.	2	1

No.	Date of accident.	Nature of oil or chemical.	Where accident occurred.	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS.	
					Killed.	Injured.

Petroleum—*concl.*

35	3rd June 1904	Kerosene	Kotri	The Magistrate of Karachi reported that two European lads were playing in the verandah of the Railway quarters and one of them struck a match and threw it into a tin of kerosene oil which immediately caught fire and burnt the staircase and some furniture. One lad died through the burns received and the other was seriously injured.	1	1
36	6th July 1904	Kerosene	Calicut	A Moplah was trying to open a tin of kerosene oil by melting the soldering of the tin cap with a lighted wick. A conflagration occurred and the man and his two children, who were near by, were covered with burning oil, resulting in the death of all three.	3	0
37	14th July 1904	Petrol	Bhowanipur, Calcutta.	The Commissioner of Police, Calcutta, reported that on the morning of the 14th July, a native passing by one end of a building noticed a light in a room reserved for the storage of petrol. The door of the room was locked, but on opening it, he found that two one-gallon tins of petrol were on fire. A number of persons had assembled near the window of the room when it appears some one struck the tins with a bamboo. The tins broke and the flames shooting through the window into the street, injured six people, four of whom succumbed to the injuries.	4	2
38	16th July 1904	Kerosene	Arkonam	A wagon containing kerosene oil in tins collided with an engine and the burning ashes set fire to the oil. No one was injured, but 50 tins of oil were destroyed.	...	...
TOTAL					42	10

## Chemicals.

39	1st March 1904	Nitric acid	Madras	In the laboratory of the Survey Office of the Board of Revenue, a native lithographer poured a quantity of nitric acid into a bottle containing a little varnish in order to clean it, and shook the bottle. The bottle immediately burst and the broken pieces hit him and two other men, injuring the former severely and the other two slightly.	...	3
40	23rd May 1904	Liq. Ammonia Fort.	Calcutta	The Commissioner of Police, Calcutta, reported that a lady went to a shop in the New Municipal Market and wanted a bottle of Liq. Ammonia Fort, but the firm having none in stock sent for a bottle, and when it was brought, the lady wanted it opened. On the bottle being opened some of it spouted out and a native gentleman who was seated near, got some of the ammonia into one of his eyes.	...	1
41	6th Oct. 1904	Red arsenic and potash.	Bombay	The Commissioner of Police reported that a Marwari took out of a cupboard a parcel containing red arsenic and another containing potash. He took the potash by mistake for alum, intending to dye his turban red, with a mixture of red arsenic and alum. While mixing the potash and arsenic, the compound exploded, causing serious injuries to his person.	...	1
42	Ditto	Nitric Acid.	Madras	The Commissioner of Police reported that a hand cart containing cases of nitric, sulphuric and muriatic acid was being drawn from the Customs House to a godown. While unloading the cases, one of the coolies who was carrying a case of nitric acid had his body burnt by some of the acid which was leaking, and he dropped the case on the ground. The acid got liberated and was thrown about injuring three other coolies who were in the godown.	...	4
TOTAL					...	9

## Miscellaneous.

43	11th Feb. 1904	Cargo, consisting of ammunition, oil, matches, sulphuric acid and general goods.	Sara	A flat loaded with general cargo was taken across to Sara by the steamer <i>Prince Alfred</i> and moored there by about 5.30 the same day. About 11.30 P.M. an alarm of fire was raised. The flat was cut adrift and allowed to go down the stream for about 200 yards where the crew dropped anchor. The fire was raging so furiously that the steamer <i>Prince Alfred</i> could not get near enough to use her pumps. The cargo amounting to over a lakh of Rupees was completely destroyed.	...	...
44	13th May 1904	Matches	Nyaungyan	At about 5 in the morning a wagon attached to a goods train was found on fire. It contained 16 cases kerosene oil, 72 tins of kerosene oil and coconut oil mixed, 3 kegs of paint, matches, brooms, dusters, etc. The cause of the fire is attributed to sparks from the engine getting into the wagon which had an opening in the top. The oil was untouched and only matches, brooms, dusters and waste paper with some miscellaneous things were found burning.	...	...



No.	Date of accident.	Nature of substance.	Where accident occurred.	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS.	
					Killed.	Injured.
Miscellaneous—concl.						
45	July 1904.	Fulminate of silver.	Bangalore .	An officer of the 64th Pioneers, while conducting certain experiments with fulminate of silver in his bungalow, met with a serious accident by the explosion of the same. A finger of his right hand had to be amputated, he lost the use of one eye and partial use of the other.	...	1
46	14th Sep. 1904 .	Bengal matches.	Madras .	The Commissioner of Police reported that a consignment of 16 cases of Bengal matches were brought to the Port Trust combustible shed. Thirteen of these were removed into the shed, and after dark, coolies were bringing the others in and while rolling a case along outside it took fire, probably due to friction. The whole case was destroyed.	...	...
47	29th Nov. 1904 .	Matches	Sion .	The Commissioner of Police, Bombay, reported that a fire occurred in the magazine of Mr. Currimbhoy Ebrahim, and it appears that the owner was moving some cases of matches (Bengal lights) manufactured at Ahmedabad to the magazine. Smoke having been seen issuing from one of these cases after being placed in the magazine, an attempt was made to remove it, but before this could be done flames broke out and three other boxes with matches which were on top of it were set on fire. Other cases of matches in close proximity next caught fire and also a box of Chinese crackers, which, after being thrown out into the compound, exploded. The first case which took fire was then thrown out into the compound where the contents slowly burned away, the charred sides of the case remaining only. The only damage done to the other cases by the fire was that one side of each case was either scorched or partially charred, but the contents of most of them were damaged by water pumped over them. Fortunately the fire occurred near the main doorway, otherwise the magazine, which contained about 800 cases of Chinese crackers, might have been considerably damaged if not completely wrecked. Owing to the Government of India having decided to follow the ruling in England, that these matches are not explosives, they will not be allowed to be stored with explosives in future.	...	...
TOTAL					...	1

## Summary of accidents during the year 1904.

Explosive or dangerous and inflammable substance.	ACCIDENTS CAUSING LOSS OF LIFE AND BODILY INJURY.			Accidents not causing loss of life or bodily injury.	Total number of accidents.
	Number of accidents.	Number of persons.			
		Killed.	Injured.		
EXPLOSIVES.					
Gunpowder . . . . .	11	25	30	...	11
Dynamite . . . . .	5	3	10	...	5
Ammunition . . . . .	1	...	1	...	1
Fireworks . . . . .	12	10	9	1	13
TOTAL	29	38	50	1	30
PETROLEUM.					
Petroleum generally . . . . .	6	42	10	2	8
TOTAL	6	42	10	2	8
CHEMICALS.					
	4	...	9	...	4
TOTAL	4	...	9	...	4
MISCELLANEOUS.					
	1	...	1	4	5
TOTAL	1	...	1	4	5
GRAND TOTAL	40	80	70	7	47

## APPENDIX C.

Detailed Statement showing the number of accidents and persons killed and injured during the five years 1900 to 1904.

YEAR.	GUNPOWDER.			DYNAMITE AND OTHER NITRO-COMPOUND BLASTING EXPLOSIVES.			AMMUNITION.			FIREWORKS.		
	No. of accidents.	Persons killed.	Persons injured.	No. of accidents.	Persons killed.	Persons injured.	No. of accidents.	Persons killed.	Persons injured.	No. of accidents.	Persons killed.	Persons injured.
1900 . . .	5	22	5	3	...	4	...	...	...	8	4	9
1901 . . .	9	8	10	7	3	14	...	...	...	12	12	18
1902 . . .	10	8	8	2	1	4	...	...	...	25	22	40
1903 . . .	5	9	1	7	5	18	...	...	...	20	8	26
1904 . . .	11	25	30	5	3	10	1	...	1	13	10	9
TOTAL . . .	40	72	54	24	12	50	1	...	1	78	56	102
AVERAGE . . .	8	14	11	5	2	10	1	...	1	16	11	20

YEAR.	PETROLEUM.			CHEMICALS.			MISCELLANEOUS.		
	No. of accidents.	Persons killed.	Persons injured.	No. of accidents.	Persons killed.	Persons injured.	No. of accidents.	Persons killed.	Persons injured.
1900 . . .	3	14	...	6	1	11	...	...	...
1901 . . .	6	21	3	4	1	1	...	...	...
1902 . . .	3	7	1	5	2	2	2	4	...
1903 . . .	9	13	14	2	6	3	...	...	...
1904 . . .	8	42	10	4	...	9	5	...	1
TOTAL . . .	29	97	28	21	10	26	7	4	1
AVERAGE . . .	6	19	6	4	2	5	1	1	...

## APPENDIX D.

Comparative Statement showing the number of accidents and persons killed and injured during the five years 1900 to 1904.

YEAR.	ACCIDENTS CAUSING LOSS OF LIFE OR BODILY INJURY.			Accidents not causing loss of life or bodily injury.	Total number of accidents.  • •
	Number of accidents.	NUMBER OF PERSONS.			
		Killed.	Injured.		
1900 . . . . .	23	41	29	2	25
1901 . . . . .	32	45	46	6	38
1902 . . . . .	42	44	55	5	47
1903 . . . . .	35	41	62	8	43
1904 . . . . .	40	80	70	7	47
TOTAL . . . . .	172	251	262	28	200
AVERAGE . . . . .	34	50	52	6	40

Accidents by fire or explosion which have been brought to the notice of the Explosives Department  
from 1st January 1904 to 31st December 1904.

No.	Date of accident.	Nature of Explosive.	Where accident occurred.	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS.	
					Killed.	Injured.
Government Accidents.						
1	23rd January 1904.	Shell . . .	At the Artillery Field Firing Camp near Poona.	A gun belonging to the 29th Field Battery had just been shifted from one position to another and was about to be fired in the new position when the shell in the gun exploded while the breech was being closed. The breech block was blown clean out. Two men were killed and one injured by the explosion. The shell which exploded had been carried from the last position in the axletree box.	2	1

## APPENDIX E.

Statement showing the imports of explosives by sea into British India from other countries in the year 1904.

QUANTITY.	IMPORTS IN 1904.					
	Bengal.	Bombay.	Sind.	Madras.	Burma.	TOTAL.
Gunpowder, black . . . lbs.	64,300	1,16,375	2,09,000	78,675	5,575	4,73,925
Gunpowder, smokeless . . . "	13,345	5,526	27,375	2,000	...	48,246
Dynamite . . . . "	79,968	...	...	30,000	40,000	1,49,968
Blasting Gelatine . . . . "	5,040	...	...	8,90,000	...	8,95,040
Gelignite or Gelatine Dynamite . "	20,048	...	...	35,000	...	55,048
Other nitro-compound explosives . "	62,738	68,073	...	...	...	1,30,811
Detonators . . . . No.	...	...	35,000	29,76,000	9,000	30,20,000
Fireworks . . . . lbs.	...	21,54,905	9,439	90,543	9,275	22,64,162
Total lbs.	2,45,439	23,44,879	2,45,814	11,26,218	54,850	40,17,200
Total No.	...	...	35,000	29,76,000	9,000	30,20,000
VALUE IN RUPEES.						
Gunpowder, black . . . .	52,666	51,761	61,486	28,675	6,220	2,00,808
Gunpowder, smokeless . . . .	37,547	21,701	37,621	7,347	...	1,04,216
Dynamite . . . . .	64,753	...	...	22,720	32,000	1,19,473
Blasting Gelatine . . . .	5,216	...	...	8,41,768	...	8,46,984
Gelignite or Gelatine Dynamite	16,338	...	...	27,802	...	44,140
Other nitro-compound explosives	56,919	29,453	...	...	...	86,372
Detonators . . . . .	15,274	...	1,035	56,593	530	73,432
Fireworks . . . . .	15,692	4,98,788	5,392	26,388	6,508	5,52,768
Total Rs.	2,64,405	6,01,703	1,05,534	10,11,293	45,258	20,28,193

## APPENDIX F.

Comparative Statement showing the import of explosives by sea into British India from other countries during the four years 1901 to 1904.

	1901.	1902.	1903.	1904.
Gunpowder, black . . . lbs.	1,78,259	2,11,035	2,72,423	4,73,925
Gunpowder, smokeless . . . "	17,379	26,605	31,004	48,246
Dynamite . . . . . "	3,55,080	1,89,896	4,16,480	1,49,968
Blasting Gelatine . . . . . "	6,10,000	7,25,000	8,43,432	8,95,040
Gelignite or Gelatine Dynamite . . . "	61,950	50,000	22,096	55,048
Other nitro-compound explosives . . . "	1,25,529	1,07,071	2,22,104	1,30,811
Detonators . . . . . No	26,79,000	32,97,509	43,88,400	30,20,000
Fireworks . . . . . lbs.	8,33,268	11,47,223	19,71,317½	22,64,162
Total lbs.	21,81,465	24,56,830	37,78,856½	40,17,200
Total No.	26,79,000	32,97,509	43,88,400	30,20,000

## APPENDIX G.

Licenses for the possession of dangerous petroleum otherwise than in bulk may granted subject to the following conditions :—

- (a) That it is stored in gas-tight tin or galvanized sheet iron, steel or lead plate drums or receptacles containing each not more than 10 gallons and fitted with well-made filling holes and well-fitting screw plugs or fitted with screw cap with metal air-tight under-cap. Such drums or receptacles shall be packed in strong wooden cases, the thickness of the wood to be not less than half an inch. Provided that wood cases shall not be necessary when the drums or receptacles are made of tin, galvanized sheet iron, or steel, and have the following thickness of metal :—
- |   |        |                 |
|---|--------|-----------------|
|   |        | Not less than   |
| (1) when the capacity does not exceed 2 gallons                       | ...    | ... 25 B. W. G. |
| (2) when the capacity exceeds 2 gallons but does not exceed 4 gallons | ... .. | ... 22 B. W. G. |
| (3) when the capacity exceeds 4 gallons                               | ...    | ... 16 B. W. G. |
- (b) That an air space of at least one-tenth of its capacity must be left in each drum or receptacle.
- (c) That the drums or receptacles shall be so substantially constructed and secured as not to be liable except under circumstances of gross negligence or extraordinary accident to be broken or become defective, leaky or insecure.
- (d) Before any vessel containing, or which has contained, dangerous petroleum is repaired by the licensee, or is sent by him to be repaired, that vessel shall, as far as practicable, be cleared of all dangerous petroleum and of all dangerous vapours arising from the same.
- (e) That the building in which petroleum is to be stored must be constructed of masonry or other unflammable material with terraced, tiled or iron roof and a tiled, paved or earthen floor.
- (f) The doorways and other openings of such buildings must be built up to such a height above the level of the road or street or the floor must be sunk to such a depth below the level of the road or street, that the petroleum stored in it cannot flow out of the building in the case of its escape from the receptacles in which it is contained, or the building itself must be surrounded with a masonry wall or embankment sufficiently high to contain all the petroleum in the building in case of its escape therefrom, or a combination of these methods may be adopted.
- (g) All ventilating openings in the building shall be protected by strong wire gauze.
- (h) No smoking or light or fire of any description shall be permitted at any time within or near any building licensed under this rule.
- (i) All due precaution shall be taken for the prevention of accidents by fire or explosion and for the prevention of unauthorised persons having access to any dangerous petroleum or to any vessels containing or intended to contain or having actually contained the same.
- (j) Every person managing or employed on or in connection with any such licensed place of storage shall abstain from any act whatever which tends to cause fire or explosion and which is not reasonably necessary and shall prevent any other persons from doing such act.
- (k) The store-house shall be liable to inspection by an officer authorised on this behalf.
- (l) No drum or other receptacle containing dangerous petroleum shall be opened or the petroleum drawn off within the room in which the stock of petroleum is kept.
- (m) The filling or replenishing of any vessels with dangerous petroleum shall not be carried on nor shall the contents of any such vessel be exposed in the presence of fire or artificial light except a light of such strength, position and character as is not liable to ignite any inflammable vapour arising from the dangerous petroleum, and no artificial light shall be brought within



dangerous proximity of the place where any vessel containing dangerous petroleum is kept.

(n) The following distances are to be kept clear from the protected works round the place of storage :—

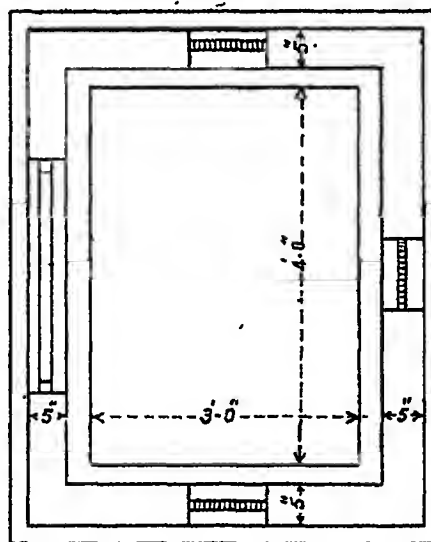
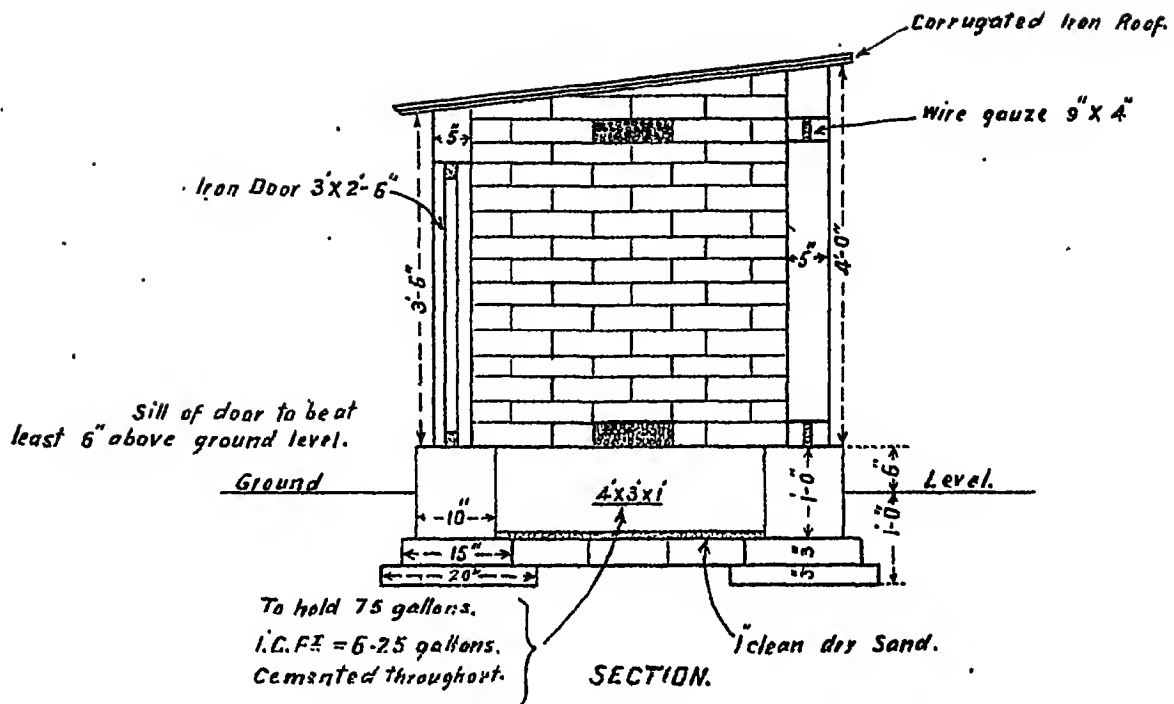
Quantity to be stored.					Distances to be kept clear when dangerous petroleum is stored in drums of not greater capacity than 4 gallons.	Distances to be kept clear when dangerous petroleum is stored in drums of capacity exceeding 4 gallons, but not exceeding 10 gallons.
Gallons.					Feet.	Feet.
Not exceeding	1,000	...	...	...	25	30
From	1,000 to 5,000	...	...	...	40	50
Do.	5,000 to 10,000	...	...	...	60	70
Do.	10,000 to 15,000	...	...	...	90	100
Do.	15,000 to 20,000	...	...	...	130	150
Do.	20,000 to 30,000	...	...	...	180	200
Do.	30,000 and over	...	...	...	200	200

(o) Provided that when the quantity to be possessed does not exceed 40 gallons, the provisions of sub-rules (e), (f) and (n) shall not apply, but the licensee shall observe the following conditions :—

(p) The store-house or building in which the dangerous petroleum is stored shall be well ventilated and constructed of unflammable material, provided however that the doors and windows may be of wood.

(ii) Where a store-house forms part of or is attached to another building and when the intervening floor or partition is of an unsubstantial or inflammable character or has openings therein, the whole of such building shall be deemed to be the store-house and no portion of such store-house shall be used as a dwelling-house or as a place where persons assemble. The store-house shall have a separate entrance from the open air distinct from any building or dwelling in which persons assemble.

## APPENDIX H.



**. PLAN.**

Scale  $\frac{1}{2}$ " to 1 Foot.

(Sd) C.A. MUSPRATT, WILLIAMS, MAJOR R.A.  
Chief Inspector of Explosives, India.  
16-12-04.



## APPENDIX J.

## CHIEF INSPECTOR OF EXPLOSIVES IN INDIA.

## NOTIFICATION.

Dated Simla, the 29th May 1905.

No. 556.—With reference to the Commerce and Industry Department Notification No. 1962-G, dated the 29th May 1905, publishing draft amendments which it is proposed to make in the rules to regulate the transport and importation of explosives, published with the like Notification No. 5528, dated the 11th October 1901, the following draft list of "authorized explosives" referred to in draft rule 2 (1) of the above draft rules is published for the information of persons likely to be affected thereby, and will be taken into consideration on or after the 1st August 1905.

## LIST OF AUTHORISED EXPLOSIVES.

The following explosives are at present authorised for importation into British India for general sale:—

## Class 1.—GUNPOWDER.

GUNPOWDER.

## Class 2.—NITRATE MIXTURE.

RIPPLENE.

## Class 3.—NITRO-COMPOUND.

Every explosive in this class and every explosive ingredient thereof shall be so thoroughly purified and otherwise of such character as to satisfy a test known as the heat test, and specified in Schedule A of Home Department Notification No. 5529, Public, dated the 11th October 1901.

## Division 1,

AMBERITE NO. 1.

BALLISTITE.

BLASTING GELATINE.

CARBONITE.

CORDITE.

CORDITE, M. D.

DYNAMITE.

GELATINE DYNAMITE NO. 1.

GELATINE DYNAMITE NO. 2, OR GELIGNITE.

Provided that every explosive in this division shall be of such character and consistency as not to be liable to liquefaction or exudation.

## Division 2.

AMBERITE NO. 2.

COOPAL'S POWDER.

E. C. SPORTING POWDER.

EMPIRE POWDER.

GUNCOTTON.

HENRITE.

SCHULTZE GUNPOWDER.

KYNOCH'S SMOKELESS SPORTING POWDER.

NEGRO POWDER.

PICRIC ACID.

PICRIC POWDER.

RIFLEITE.

ROBURITE.

S. R. POWDER.  
S. S. POWDER.  
SMOKELESS POWDER.  
SMOKELESS BLASTING POWDER.

Class 4.—CHLORATE MIXTURE.

Nil.

Class 5.—FULMINATE.

Nil.

Class 6.—AMMUNITION.

Division 1.

SAFETY FUZES FOR BLASTING.  
SAFETY ELECTRIC FUZES.  
PERCUSSION CAPS.  
RAILWAY FOG SIGNALS.  
SAFETY CARTRIDGES.

Division 2.

CARTRIDGES FOR CANNON, SHELLS, MINES, BLASTING OR OTHER LIKE PURPOSES.  
CARTRIDGES FOR SMALL ARMS WHICH ARE NOT SAFETY CARTRIDGES.

ELECTRIC FUZES.  
FUZES FOR BLASTING WHICH ARE NOT SAFETY FUZES.  
FUZES FOR SHELLS.  
TUBES FOR FIRING EXPLOSIVES.  
WAR ROCKETS.

Division 3.

CARTRIDGES FOR SMALL ARMS, WHICH ARE NOT SAFETY CARTRIDGES.  
DETONATORS.

ELECTRIC DETONATORS.  
FUZES FOR BLASTING WHICH ARE NOT SAFETY FUZES.  
FRICTION TUBES.  
FUZES FOR SHELLS.  
TUBES FOR FIRING EXPLOSIVES.

Class 7.—FIREWORK.

Division 1.

Nil.

Division 2.—Manufactured Fireworks.

MANUFACTURED FIREWORKS.  
AMORGES.  
CHINESE CRACKERS.

C. A. MUSPRATT-WILLIAMS, Major, R.A.,  
*Chief Inspector of Explosives in India.*

APPENDIX K.

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*Instructions for the destruction of Dynamite and other similar explosives.*

Not more than 50 lbs. of dynamite should be destroyed at a time. A clear space of ground about 100 yards all-round should be selected, and a line of shavings or dry straw or grass laid down. On this the cartridges of dynamite should be placed in a continuous line not more than two abreast with the cartridge wrappers and any other available paper below them, and with an interval of an inch between each two cartridges. Paraffin or other similar oil should then be poured over the shavings, straw or grass and cartridges to accelerate the combustion. The line of shavings, straw or grass should be prolonged some distance beyond the dynamite (say 20 feet), and lit with a short length of safety fuse and the operator should then retire quickly to a safe distance.

The ground on which the destruction is to take place should be clear of dry grass and inflammable substances. The direction of the fire should be about an angle of  $45^{\circ}$  to the direction of the wind and the fire should be ignited from the weather end.

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*Instructions for the destruction of Detonators.*

Detonators should be disposed of by being taken to a deep river, or to the sea, and then thrown into deep water by twos and threes, or they may be thoroughly soaked in mineral oil for 48 hours and then be destroyed one at a time, under suitable precautions, by burning.